Single element OOFEM analysis with CDPM2

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1 Introduction

This document describes the results obtained from a set of single element analyses with the development version of OOFEM using CDPM2. This material model is based on work published in Grassl and Jirásek (2006); Grassl et al. (2013, 2011). The aim of this study is to demonstrate the response obtained with CDPM2 in uniaxial tension, and how it depends on the element length. More information on CDPM2 in OOFEM can be be found on:
http://petergrassl.com/Research/DamagePlasticity/CDPMOOFEM/index.html

2 Cube subjected to tension

The first set of analyses consists of three cube elements of length 5, 10 and 20 mm subjected to uniaxial tension in the z-direction. The input files for these analyses are located in the folders CubeTensionSmall, CubeTensionMedium and CubeTensionLarge. The stress-displacement and stress-strain curves for the three analyses are shown in Figure 1 and Figure 2, respectively.

The displacement at which the stress becomes equal to zero is independent of the element length. Therefore, the model is expected to provide mesh-independent solutions in situations in which displacements localise in element length dependent zones, which is usually

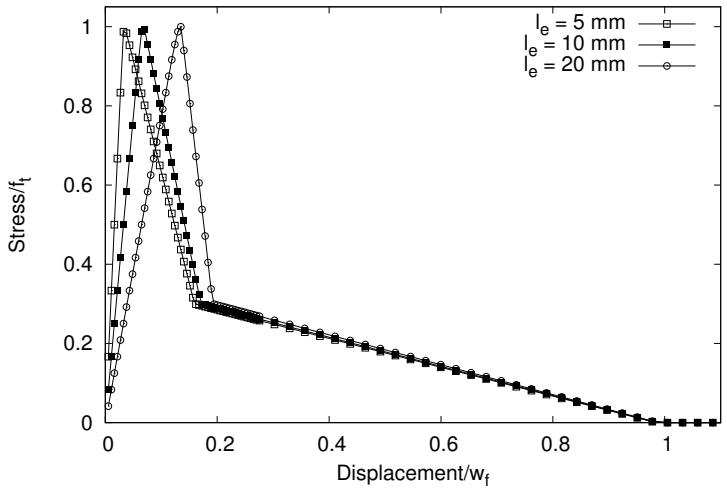

Figure 1: Stress versus displacement in uniaxial tension for cubes with three element lengths using CDPM2 in OOFEM.

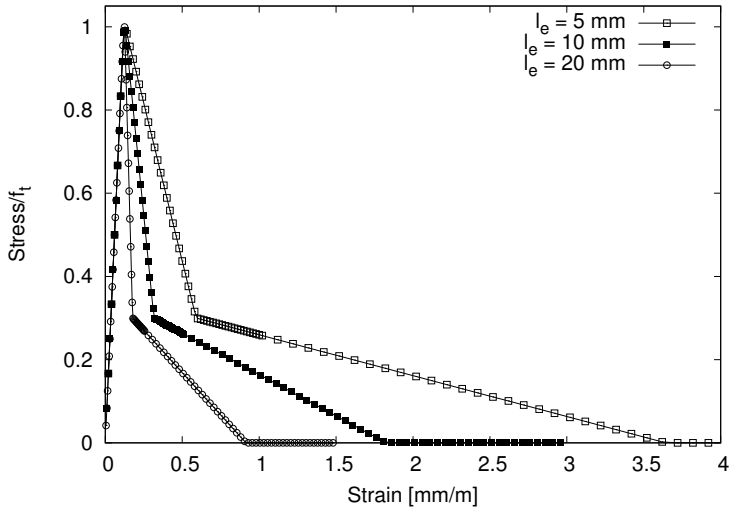

Figure 2: Stress versus strain in uniaxial tension for cubes with three element lengths using CDPM2 in OOFEM.

expected for analyses involving cracking. Correspondingly, the stress-strain curves are mesh-dependent in the post-peak with the smallest element providing the largest strain at the point at which the stress becomes zero.

References

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Grassl, P., Nyström, U., Rempling, R., Gylltoft, K., 2011. A damage-plasticity model for the dynamic failure of concrete, in: 8th International Conference on Structural Dynamics, Leuven, Belgium.

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